<u>In the claims:</u>

This listing of claims will replace all prior versions and listings of claims in the application:

1. (currently amended) A method for manufacturing an integrated circuit having a layer of material, the layer described by a layout, wherein substantially all of the layer of material will be defined using phase shifting, the method comprising:

identifying a plurality of features in the layout to be defined using phase shifting, each of the plurality of features comprised of a plurality of edges;

placing a plurality of shifter shapes proximate to edges of the plurality of features, wherein the plurality of features includes a first feature having a first edge and a second edge, the first edge adjoining the second edge, and wherein the plurality of shifter shapes includes a first shifter shape placed on [[a]] <u>the</u> first edge and a second shifter shape placed on [[a]] <u>the</u> second edge, the first shifter shape and the second shifter shape separated by a minimum distance;

assigning phase to the plurality of shifter shapes according to phase dependencies and costs to create a plurality of phase shifters; and

refining the plurality of phase shifters.

2. (original) The method of claim 1, wherein the placing the plurality of shifter shapes further comprises: defining a maximum shifter area, the maximum shifter area surrounding the plurality of features in the layout, the maximum shifter area corresponding to locations on the layout where the plurality of shifter shapes are to be placed.

3. (previously presented) The method of claim 1, wherein placing the first shifter shape and the second shifter shape separated by a minimum distance further comprises placing the first

Application No. 10/085,759   NMTI 1002-6
                                                    (747CON4)

shifter shape and the second shifter shape such that a cut can be admitted between the first shifter

shape and the second shifter shape.

4. (original) The method of claim 1, wherein the assigning further comprises using a

plurality of cost functions for describing the relative quality of accepting a particular phase

assignment, the plurality of cost functions including one or more of an inner corner cost function,

an outer corner cost function, a three edge cost function, a small shifter area cost function, a

phase conflict cost function, and a multi-layer cost function.

5. (original) The method of claim 1, wherein the refining further comprises one or more

of:

merging adjacent phase shifters in the plurality of phase shifters that have the same

phase;

extending phase shifters in the plurality of phase shifters by squaring off corners;

extending phase shifters in the plurality of phase shifters by filling open spaces between

adjacent phase shifters with dominant or subordinate phase; and

adjusting shifter shapes to be design rule check compliant.

6. (original) The method of claim 1, further comprising defining a plurality of trim shapes

from the plurality of features and the plurality of phase shifters.

7. (original) The method of claim 6, further comprising:

generating a first mask data file from the plurality of phase shifters; and

generating a second mask data file from the plurality of trim shapes.

8. (original) The method of claim 1, wherein the placing further comprises using an initial shifter shape for the plurality of shifter shapes, the initial shifter shape comprised of a trapezoid stacked on top of a rectangle, wherein the rectangular portion immediately adjacent feature edges.

9. (previously presented) The method of claim 1, wherein substantially all of the layer of material will be defined using phase shifting further comprises one or more of the following: at least eighty percent (80%) of the non-memory portions of the layer are defined by the plurality of phase shifters; at least eighty percent (80%) of a part of the floorplan in the layout is defined by the plurality of phase shift shifters; at least ninety percent (90%) of the layout is defined by the plurality of phase shifters; all of the features in the critical path of the layout are defined by the plurality of phase shifters; all features in the layout except those features that are not phase shifted due to phase conflicts are defined by the plurality of phase shifters; everything in the layout except test structures are defined by the plurality of phase shifters; and everything in the layout except dummy structures are defined by the plurality of phase shifters.

33. (currently amended) A method for manufacturing an integrated circuit having a layer of material, the layer described by a layout, wherein substantially all of the layer of material will be defined using phase shifting, the method comprising:

identifying a plurality of features in the layout to be defined using phase shifting, each of the plurality of features comprised of a plurality of edges;

creating a plurality of phase shifters by placing, and assigning phase to, and refining a plurality of shifter shapes proximate to edges of the plurality of features, wherein the plurality of

features includes a first feature having a first edge and a second edge, the first edge adjoining the

second edge, and wherein the plurality of shifter shapes includes a first shifter shape placed on

[[a]] the first edge and a second shifter shape placed on [[a]] the second edge, the first shifter

shape and the second shifter shape separated by a minimum distance;

exposing radiation sensitive material to radiation according to a pattern defined using the

plurality of phase shifters; and

developing the exposed radiation sensitive material to define the layout, and forming said

layer of material according to the layout.

34. (previously presented) The method of claim 33, wherein the placing of the plurality of

shifter shapes further comprises: defining a maximum shifter area, the maximum shifter area

surrounding the plurality of features in the layout, the maximum shifter area corresponding to

locations on the layout where the plurality of shifter shapes are to be placed.

35. (previously presented) The method of claim 33, wherein placing the first shifter shape

and the second shifter shape separated by a minimum distance further comprises placing the first

shifter shape and the second shifter shape such that a cut can be admitted between the first shifter

shape and the second shifter shape.

36. (previously presented) The method of claim 33, wherein the assigning further

comprises using a plurality of cost functions for describing the relative quality of accepting a

particular phase assignment, the plurality of cost functions including one or more of an inner

corner cost function, an outer corner cost function, a three edge cost function, a small shifter area

cost function, a phase conflict cost function, and a multi-layer cost function.

Application No. 10/085,759   NMTI 1002-6
                                                            (747CON4)

37. (previously presented) The method of claim 33, wherein the refining further comprises one or more of:

merging adjacent phase shifters that have the same phase;

extending phase shifters by squaring off corners;

extending phase shifters by filling open spaces between adjacent phase shifters with dominant or subordinate phase; and

adjusting shifter shapes to be design rule check compliant.

38. (previously presented) The method of claim 33, further comprising defining a plurality of trim shapes from the plurality of features and the plurality of phase shifters and exposing said radiation sensitive material to radiation according to the trim shapes.

39. (previously presented) The method of claim 38, further comprising:

generating a first mask data file from the plurality of phase shifters; and

generating a second mask data file from the plurality of trim shapes.

40. (previously presented) The method of claim 33, wherein the placing further comprises using an initial shifter shape for the plurality of shifter shapes, the initial shifter shape comprised of a trapezoid stacked on top of a rectangle, wherein the rectangular portion is immediately adjacent feature edges.

41. (previously presented) The method of claim 33, wherein substantially all of the layer of material will be defined using phase shifting which further comprises one or more of the

Page 6 of 10

Application No. 10/085,759   NMTI 1002-6
                                                               (747CON4)

following: at least eighty percent (80%) of the non-memory portions of the layer are defined by

the plurality of phase shifters; at least eighty percent (80%) of a part of the floorplan in the layout

is defined by the plurality of phase shift shifters; at least ninety percent (90%) of the layout is

defined by the plurality of phase shifters; all of the features in the critical path of the layout are

defined by the plurality of phase shifters; all features in the layout except those features that are

not phase shifted due to phase conflicts are defined by the plurality of phase shifters; everything

in the layout except test structures are defined by the plurality of phase shifters; and everything

in the layout except dummy structures are defined by the plurality of phase shifters.

42. (currently amended) A method for manufacturing an integrated circuit having a layer

of material, the layer described by a layout, the method comprising:

identifying a plurality of features in the layout to be defined using phase shifting, each of

the plurality of features comprised of a plurality of edges;

placing a plurality of shifter shapes proximate to edges of the plurality of features,

wherein the plurality of features includes a first feature having a first edge and a second edge, the

first edge adjoining the second edge, and wherein the plurality of shifter shapes includes a first

shifter shape placed on [[a]] the first edge and a second shifter shape placed on [[a]] the second

edge, the first shifter shape and the second shifter shape, the first and second shifter shapes

respectively comprised of a trapezoid stacked on top of a rectangle, with the rectangular portion

immediately adjacent feature edges;

assigning phase to the plurality of shifter shapes according to phase dependencies and

costs to create a plurality of phase shifters; and

refining the plurality of phase shifters.

Application No. 10/085,759   NMTI 1002-6
                                                             (747CON4)

43. (previously presented) The method of claim 42, wherein the placing the plurality of shifter shapes further comprises: defining a maximum shifter area, the maximum shifter area surrounding the plurality of features in the layout, the maximum shifter area corresponding to locations on the layout where the plurality of shifter shapes are to be placed.

44. (previously presented) The method of claim 42, wherein placing the first shifter shape and the second shifter shape further comprises placing the first shifter shape and the second shifter shape such that a cut can be admitted between the first shifter shape and the second shifter shape.

45. (previously presented) The method of claim 42, wherein the assigning further comprises using a plurality of cost functions for describing the relative quality of accepting a particular phase assignment, the plurality of cost functions including one or more of an inner corner cost function, an outer corner cost function, a three edge cost function, a small shifter area cost function, a phase conflict cost function, and a multi-layer cost function.

46. (previously presented) The method of claim 42, wherein the refining further comprises one or more of:

merging adjacent phase shifters in the plurality of phase shifters that have the same phase;

extending phase shifters in the plurality of phase shifters by squaring off corners;

extending phase shifters in the plurality of phase shifters by filling open spaces between adjacent phase shifters with dominant or subordinate phase; and

adjusting shifter shapes to be design rule check compliant.

Application No. 10/085,759   NMTI 1002-6
                                                             (747CON4)

47. (previously presented) The method of claim 42, further comprising defining a plurality of trim shapes from the plurality of features and the plurality of phase shifters.

48. (previously presented) The method of claim 47, further comprising:

generating a first mask data file from the plurality of phase shifters; and

generating a second mask data file from the plurality of trim shapes.

49. (previously presented) The method of claim 42, wherein placing the first shifter shape and the second shifter shape further comprises placing the first shifter shape and the second shifter shape such that the first shifter shape and the second shifter shape are separated by a minimum distance.

50. (previously presented) The method of claim 42, wherein said plurality of features comprises a substantial part of the layer.

///